EXHIBIT D

Exhibit D

Exemplary Accused Devices

Exemplary Router and Access Point Devices Provided by AT&T that support Wi-Fi 6 (and later):

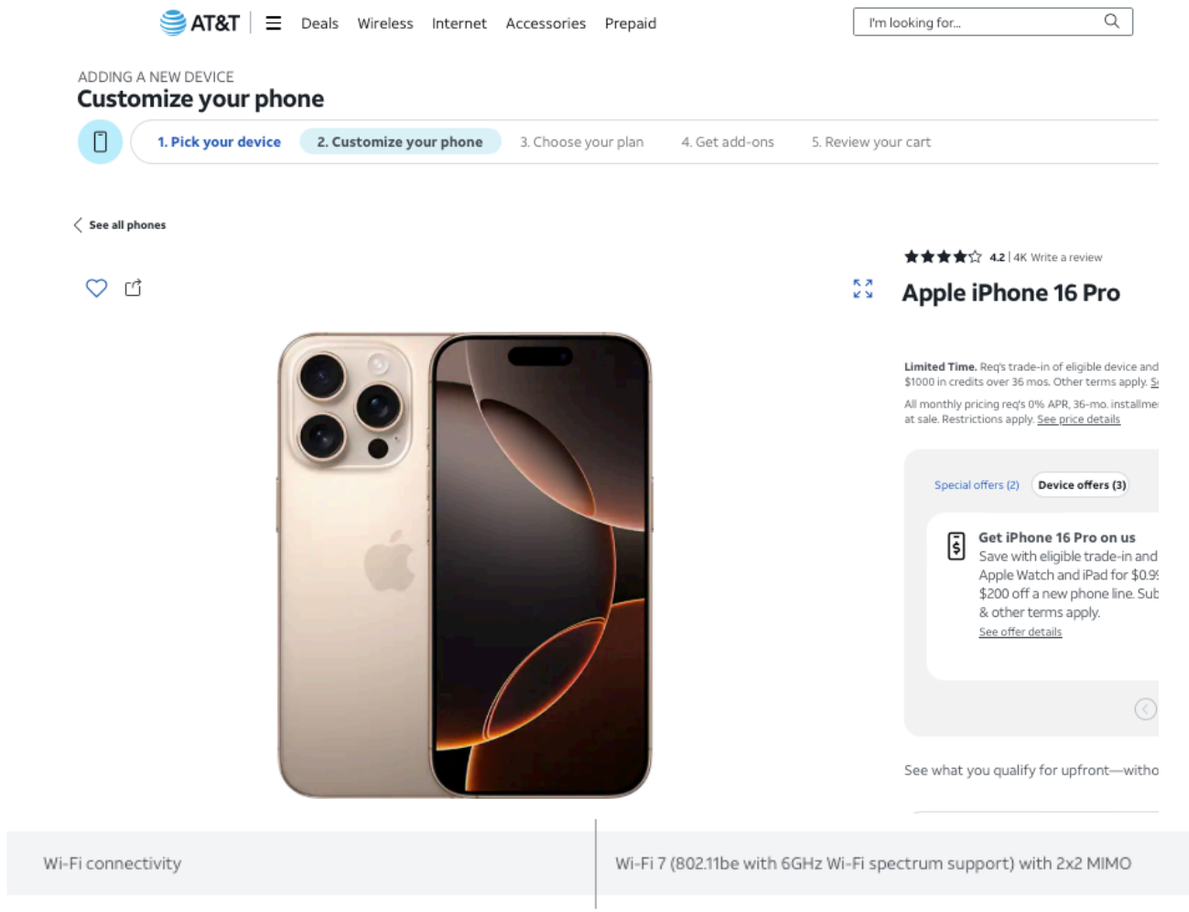
AT&T's Internet Air for Business 5G Gateway, Franklin's A50 5G Mobile Hotspot (RG2102), Netgear's Nighthawk M7 Pro (MR7400), Netgear's Nighthawk M6 Pro (MR6500), Netgear's Nighthawk M6 (MR6110), Netgear's Nighthawk 5G Mobile Hotspot Pro (MR5100) Netgear's Nighthawk 5G Mobile Hotspot (MR5000)

Exemplary Client Devices Provided by AT&T that support Wi-Fi 6 (and later):

Google Pixel 8a, Google Pixel 8, Google Pixel 7a, Google Pixel 9 Pro XL, Google Pixel 9 Pro, Google Pixel 9, Motorola Razr+ 2024, Motorola moto g stylus 5G – 2024, Motorola Razr – 2023, Apple – iPhone 16 Pro, Apple - iPhone 16 Pro Max, Apple - iPhone 16 Plus, Apple - iPhone 16, Apple – iPhone 15, Apple - iPhone 15 Pro Max, Apple - iPhone 15 Pro, Apple - iPhone SE 3rd Gen (2022), Apple - iPhone 14, Apple - iPhone 15 Plus, , Apple - iPad Pro 13-inch (2024), Apple - iPad 10th Generation (2022), Apple - iPad Air 13-inch (2024), Apple - iPad Pro 11-inch (2024), Apple - iPad Air 11-inch (2024), Apple - iPad mini (2024), Apple - iPad mini (2021), Apple – iPhone 16 Pro, Apple - iPhone 16 Pro Max

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)
[1Pre] A method for transmitting information in a network, the method comprising the steps of: [1A] initiating transmission over a communication channel; multiple packets being transmitted simultaneously and successfully received over the communication channel;	AT&T provides/sells the Wi-Fi 6 (802.11ax) (and later) compatible client devices or non-access point (non-AP) stations (STAs) (i.e., the "accused devices"). The accused devices have the capability to work as non-AP STAs connected to a Wi-Fi 6 (and later) network. The devices comprise a method for transmitting information in a network. The devices transmit signals over a communication channel and receive signals transmitted by an Access Point (AP). The accused devices support essential features like carrier sensing, Orthogonal Frequency Division Multiple Access (OFDMA), and Multiple Input, Multiple Output (MIMO) mechanisms. Further, AT&T also offers Wi-Fi network/infrastructure supporting Wi-Fi 6 (and later) access points. According to 802.11ax, AT&T's non-AP stations (i.e., the accused devices) can simultaneously transmit uplink transmissions using either Uplink (UL) OFDMA or UL Multi-user Multiple Input, Multiple Output (MU-MIMO), or a combination of the two, for example, within transmission opportunities (TXOP) configured using trigger frames. Specifically, 802.11ax specifications disclose that a non-AP station initiates the transmission of PPDUs (Physical Protocol Data Units) (e.g., High Efficiency Trigger-based PPDUs (HE TB PPDUs)) upon receiving the PHY-TXSTART.request (TXVECTOR) primitive at the physical layer (PHY), thereby initiating transmission over a communication channel. Wi-Fi 6 (and later) compatible client devices support uplink transmissions via uplink (UL) OFDMA, which allows multiple client devices to transmit simultaneously to the AP by utilizing distinct Resource Units (RUs) within the uplink channel, satisfying the same requirement for simultaneous packet transmission, which are successfully received by the AP (i.e., multiple packets being transmitted simultaneously and successfully received over the communication channel). Likewise, the accused devices support UL MU-MIMO, which also allows multiple client devices to transmit PPDUs simultaneously over the communication channel to an AP (i.e., multiple packets being transmitted simultaneously and successfully received over the communication channel).

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)
	See, e.g., Currently, from AT&T **NEXT GEN WI-FI 6 AND OUR NEW GATEWAY** A new and improved Wi-Fi is here, setting the standard for how we connect Wi-Fi is everywhere, and we use it for nearly everything these days. From cars to coffee makers, our reliance on wireless internet has grown exponentially in recent years. We need the strongest, and the smartest, Wi-Fi we can get, and that is especially true in more populated areas. More people mean more need, and more need means more data being exchanged. So, what is next in the evolution of the very thing that keeps us moving? Introducing Wi-Fi 6, the next-generation in wireless internet. While it offers more speed, it can also provide better performance in densely populated areas, from concerts and sports arenas to your multi-family homes and buildings. Wi-Fi 6 has launched, but its true power is still yet to be felt. **Source:** Robbie Imes, *Next Gen Wi-Fi 6 and Our New Gateway: A New and Improved Wi-Fi Is Here, Setting the Standard for How We Connect,* AT&T, https://more.att.com/currently/this-month/fiber/next-gen-wi-fi-6-and-our-new-gateway

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)
	 **Source:** Apple iPhone 16 Pro, AT&T, https://www.att.com/buy/phones/apple-iphone-16-pro.html

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)

An HE AP sends a Trigger frame to initiate UL MU operation using UL OFDMA or UL MU-MIMO transmissions or a frame containing a TRS Control subfield to initiate UL OFDMA transmissions. The frame initiating these transmissions in the uplink direction is a triggering frame. The triggering frame identifies non-AP STAs participating in UL MU operation and assigns RUs and/or spatial streams to these STAs. Multi-STA BlockAck frames can be used by the AP to acknowledge the frames transmitted by multiple non-AP STAs. The scheduling of these Trigger frames can be set up between a non-AP STA and the AP using TWT operation to save power and reduce collisions.

Source: IEEE 802.11 ax, Page 48 of 766

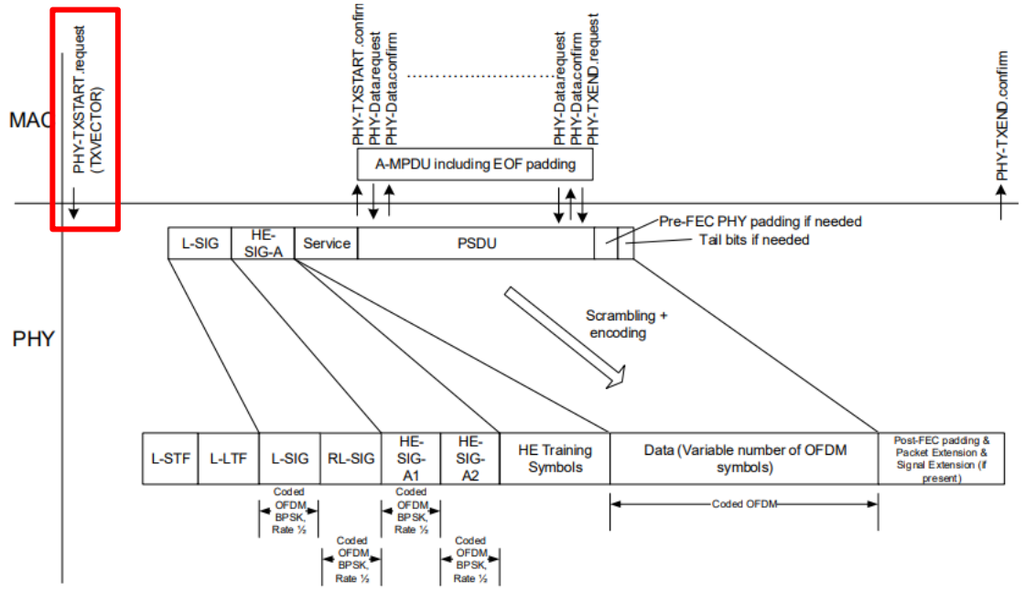


Figure 27-57—PHY transmit procedure for an HE TB PPDU

Source: IEEE 802.11 ax, Page 649 of 766.

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)

In all options, in order to transmit data, the MAC generates a PHY-TXSTART.request primitive, which causes the PHY entity to enter the transmit state. Further, the PHY is set to operate at the appropriate frequency through station management via the PLME, as specified in 27.4. Other transmit parameters, such as HE-MCS, coding types, and transmit power, are set via the PHY-SAP using the PHYTXSTART.request(TXVECTOR) primitive, as described in 27.2.2. After transmitting a PPDU that carries a Trigger frame, the MAC sublayer issues a PHY-TRIGGER.request with a TRIGVECTOR parameter that provides the PHY entity with the information needed to demodulate the expected HE TB PPDU response. The remainder of this subclause applies to the first four options.

The PHY indicates the state of the primary channel and other channels (if any) via the PHY-CCA.indication primitive (see 21.3.18.5 and 8.3.5.12). Transmission of the PPDU shall be initiated by the PHY after receiving the PHY-TXSTART.request(TXVECTOR) primitive. The TXVECTOR parameters for the PHY-TXSTART.request primitive are specified in Table 27-1.

Source: IEEE 802.11 ax, Page 650 of 766.

27.3.3.2 UL MU-MIMO

27.3.3.2.1 Introduction

UL MU-MIMO is a technique to allow multiple STAs to transmit simultaneously over the same frequency resource to the receiver. The concept is very similar to SU-MIMO where multiple space-time streams are transmitted simultaneously over the same frequency resource utilizing spatial multiplexing through multiple antennas at the transmitter and receiver. The key difference from SU-MIMO is that in UL MU-MIMO, the transmitted streams originate from multiple STAs.

Source: IEEE 802.11 ax, Page 509 of 766.

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)

27.3.3.2.4 Maximum number of spatial streams in UL MU-MIMO

A non-AP STA that supports UL MU-MIMO shall support transmitting an HE TB PPDU using MU-MIMO where

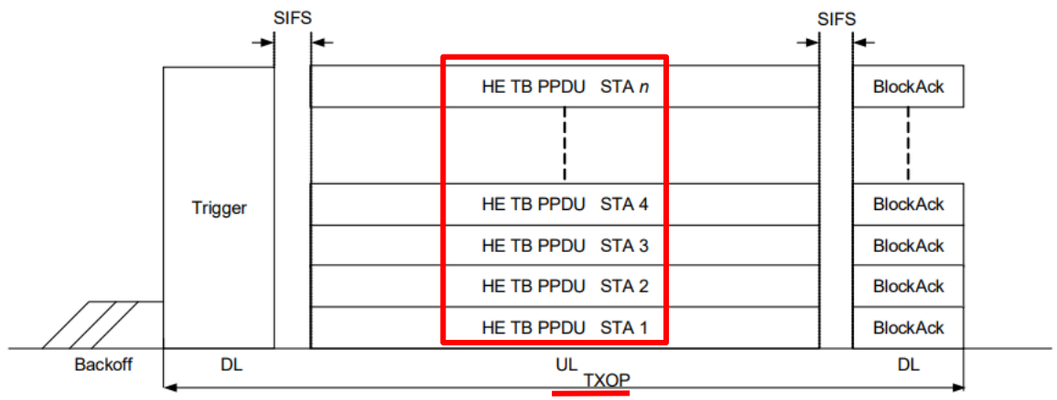
— The number of spatial streams allocated to the non-AP STA ranges from 1 to *N*, where *N* is the smaller of 4 and the maximum number of spatial streams supported by the non-AP STA for transmitting HE SU PPDUs.

— The number of total spatial streams (summed over all users) is less than or equal to 8.

Source: IEEE 802.11 ax, Page 510 of 766.

The HE PHY extends the maximum number of users supported for DL MU-MIMO transmissions to 8 users per resource unit (RU) and provides support for DL and UL orthogonal frequency division multiple access (OFDMA) as well as for UL MU-MIMO. Both DL and UL MU-MIMO transmissions are supported on portions of the PPDU bandwidth (on resource units greater than or equal to 106 tones). In an MU-MIMO resource unit, there is support for up to 8 users with up to 4 space-time streams per user with the total across all users not exceeding 8 space-time streams.

Source: IEEE 802.11 ax, Page 465 of 766.



Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)

Source: IEEE 802.11 ax, Page 241 of 766.

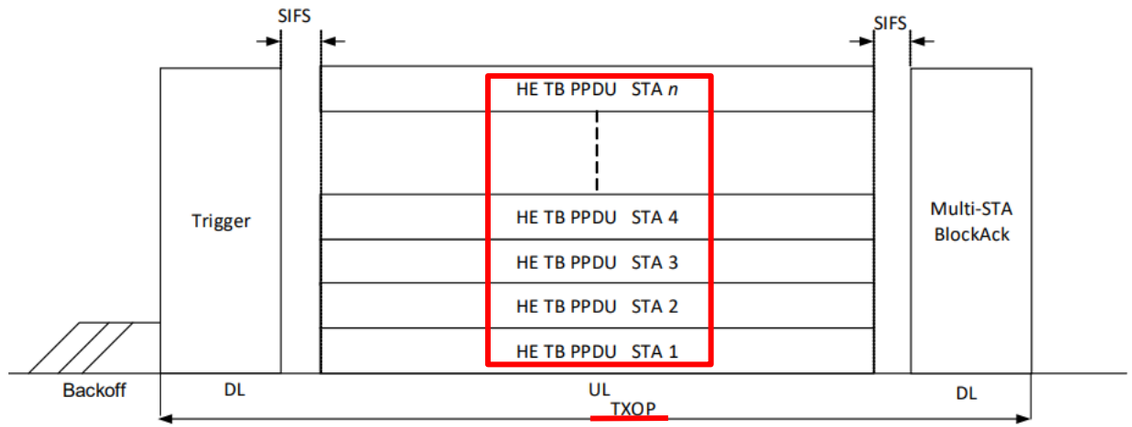
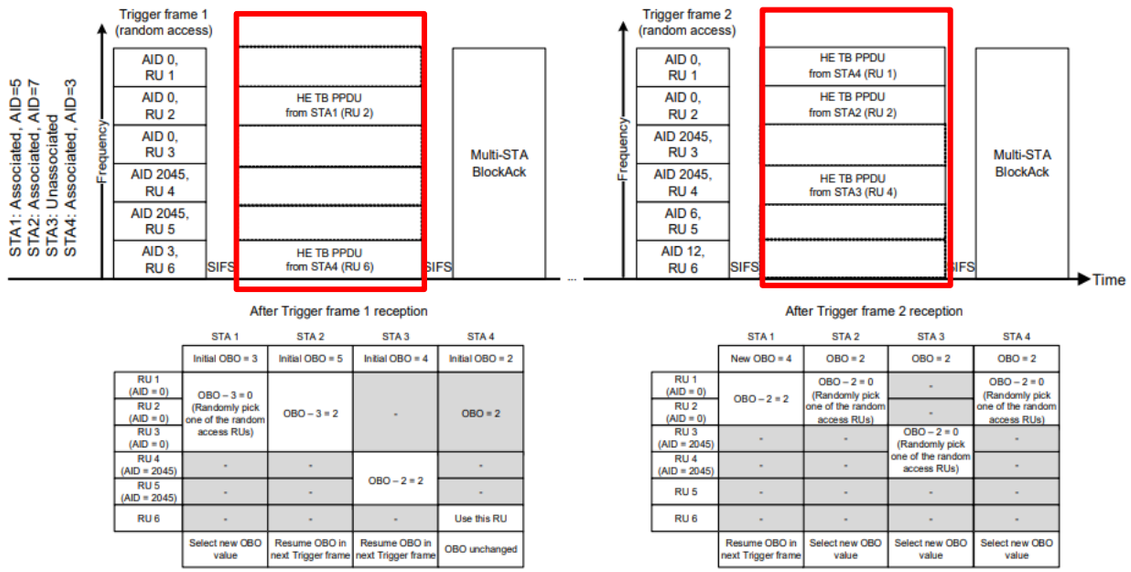


Figure 10-14c—Example of UL MU transmissions with immediate Multi-STA BlockAck frame acknowledging MPDUs

Source: IEEE 802.11 ax, Page 241 of 766.

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)
	26.5.4.3 Transmission procedure for UORA In this subclause, the transmit procedure using RA-RUs is described with respect to UORA parameters. The procedure is also illustrated in Figure 26-6.  **Figure 26-6—Illustration of UORA procedure** **Source:** IEEE 802.11 ax, Page 360 of 766.
[1B] determining, by means of a control sub-system, whether signal energy of transmissions on said	According to 802.11ax, before initiating a transmission of PPDU (ex. transmission of HE TB PPDU), the Clear Channel Assessment (CCA) procedure is performed to check for a PHY-CCA.indication (IDLE/BUSY). During the CCA process, the non-AP STA measures the signal energy level on the communication channel and compares it to the CCA-ED threshold. If the measured energy exceeds the CCA-ED threshold, the medium is deemed BUSY

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)
communication channel exceeds a predetermined amount;	(i.e., determining, by means of a control sub-system, whether signal energy of transmissions on said communication channel exceeds a predetermined amount). The accused devices, thus, determine by means of control subsystem (i.e., hardware and/or associated software embodying the described 802.11ax CCA feature) whether signal energy of transmissions on said communication channel exceeds a predetermined amount. *See, e.g.,* **26.5.2.5 UL MU CS mechanism** The ED-based CCA and virtual CS functions are used to determine the state of the medium if CS is required before responding to a received Trigger frame. ED-based CCA for the UL MU CS mechanism is defined in 27.3.20.6.4, and virtual CS is defined in 10.3.2.1. **Source:** IEEE 802.11ax , Page 356 of 766. The PHY shall indicate a clear channel by issuing a PHY-CCA.indication(IDLE) primitive. The MAC considers this indication before issuing the PHY-TXSTART.request primitive. Transmission of the PPDU shall be initiated after receiving the PHY-TXSTART.request(TXVECTOR) primitive. The TXVECTOR elements for the PHY-TXSTART.request primitive are the PHY header parameters DATARATE, SERVICE, and LENGTH and the PHY parameters TXPWR_LEVEL_INDEX and TIME_OF_DEPARTURE_REQUESTED. **Source:** IEEE 802.11 - 2020, Page 2839 of 4379.

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)
	21.3.18.5.2 CCA sensitivity for operating classes requiring CCA-ED For the operating classes requiring CCA-Energy Detect (CCA-ED), the PHY shall also indicate a medium busy condition when CCA-ED detects a channel busy condition. For improved spectrum sharing, CCA-ED is required in some bands. The behavior class indicating CCA-ED is given in Table D-2. The operating classes requiring the corresponding CCA-ED behavior class are given in E.1. The PHY of a STA that is operating within an operating class that requires CCA-ED shall operate with CCA-ED. CCA-ED shall detect a channel busy condition when the received signal strength exceeds the CCA-ED threshold as given by dot11OFDMEDThreshold for the primary 20 MHz channel, dot11OFDMEDThreshold for the secondary 20 MHz channel (if present), dot11OFDMEDThreshold + 3 dB for the secondary 40 MHz channel (if present), and dot11OFDMEDThreshold + 6 dB for the secondary 80 MHz channel (if present). The CCA-ED thresholds for the operating classes requiring CCA-ED are subject to the criteria in D.2.5. **Source:** IEEE 802.11 - 2020, Page 3104 of 4379.
[1C] preventing transmission over said communication channel, if it has been determined, by the control sub-system, that said signal energy exceeds the predetermined amount;	According to 802.11ax, a transmission of PPDU (e.g., transmission of a HE TB PPDU) is initiated only after receiving a PHY-CCA.indication(IDLE). This means that the transmission will not proceed (i.e., preventing transmission over said communication channel) if a PHY-CCA.indication(BUSY) is received, which occurs when the signal energy on the communication channel exceeds the CCA-ED threshold (i.e., if it has been determined, by the control sub-system, that said signal energy exceeds the predetermined amount). Therefore, the accused devices prevent transmission over said communication channel, if it has been determined, by the control sub-system, that said signal energy exceeds the predetermined amount. *See, e.g.,*

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)
	26.5.2.5 UL MU CS mechanism The ED-based CCA and virtual CS functions are used to determine the state of the medium if CS is required before responding to a received Trigger frame. ED-based CCA for the UL MU CS mechanism is defined in 27.3.20.6.4, and virtual CS is defined in 10.3.2.1. **Source:** IEEE 802.11ax , Page 356 of 766. The PHY shall indicate a clear channel by issuing a PHY-CCA.indication(IDLE) primitive. The MAC considers this indication before issuing the PHY-TXSTART.request primitive. Transmission of the PPDU shall be initiated after receiving the PHY-TXSTART.request(TXVECTOR) primitive. The TXVECTOR elements for the PHY-TXSTART.request primitive are the PHY header parameters DATARATE, SERVICE, and LENGTH and the PHY parameters TXPWR_LEVEL_INDEX and TIME_OF_DEPARTURE_REQUESTED. **Source:** IEEE 802.11 - 2020, Page 2839 of 4379. **21.3.18.5.2 CCA sensitivity for operating classes requiring CCA-ED** For the operating classes requiring CCA-Energy Detect (CCA-ED), the PHY shall also indicate a medium busy condition when CCA-ED detects a channel busy condition. For improved spectrum sharing, CCA-ED is required in some bands. The behavior class indicating CCA-ED is given in Table D-2. The operating classes requiring the corresponding CCA-ED behavior class are given in E.1. The PHY of a STA that is operating within an operating class that requires CCA-ED shall operate with CCA-ED. CCA-ED shall detect a channel busy condition when the received signal strength exceeds the CCA-ED threshold as given by dot11OFDMEDThreshold for the primary 20 MHz channel, dot11OFDMEDThreshold for the secondary 20 MHz channel (if present), dot11OFDMEDThreshold + 3 dB for the secondary 40 MHz channel (if present), and dot11OFDMEDThreshold + 6 dB for the secondary 80 MHz channel (if present). The CCA-ED thresholds for the operating classes requiring CCA-ED are subject to the criteria in D.2.5. **Source:** IEEE 802.11 - 2020, Page 3104 of 4379.

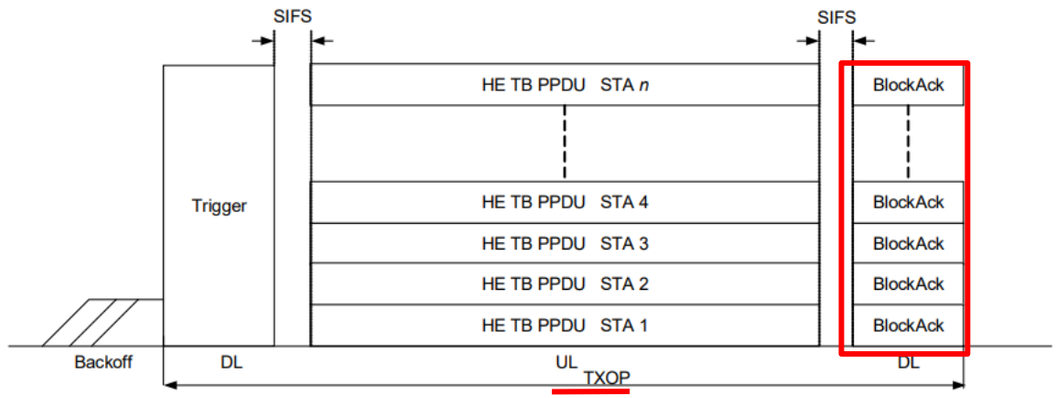
Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)
[1D] monitoring a feedback channel; transmitted feedback information originates at a receiver, said receiver receiving and decoding simultaneously transmitted multiple packets; said transmitted feedback information conveying whether one or more of said simultaneously transmitted multiple packets can not be successfully decoded;	According to the 802.11ax standard, a non-AP STA transmitting a HE TB PPDU waits for a specified timeout interval to confirm the success of the transmission. This is determined by receiving a valid response frame (e.g. PPDU carrying a Block Ack frame) over the feedback channel (e.g., the Resource Units (RUs) allocated for transmission of a response frame (e.g. PPDU carrying a Block Ack frame)). The PPDU carrying a Block Ack frame originates at a receiver, namely, the AP receiving the HE TB PPDU (i.e., transmitted feedback information originates at a receiver). The step of successfully receiving HE TB PPDU comprises both receiving and decoding (i.e., said receiver receiving and decoding simultaneously transmitted multiple packets, which the AP can do). Additionally, if the STA does not receive a valid response frame (e.g., a PPDU carrying a Block Ack frame) or if an invalid or unrelated frame is received, the entire transmission is considered failed. Furthermore, even if a valid Block Ack frame is received, it may indicate partial transmission failures for specific portions of the data. In such cases, the failed portions correspond to data that was not successfully decoded by the AP. Thus, the feedback information conveys whether one or more of "said simultaneously transmitted multiple packets cannot be successfully decoded." *See, e.g.*,

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)

10.3.2.13.3 Acknowledgment procedure for UL MU transmission

An AP that receives frames from more than one STA that are part of an UL MU transmission (see 9.42.2) and that require an immediate acknowledgment (i.e., a QoS Data frame with Normal Ack or Implicit BAR ack policy or a Management frame other than an Action No Ack frame), shall send an immediate acknowledgment in either an SU PPDU (see 26.4.4.5) or an HE MU PPDU (see 26.4.4.6). The Multi-STA BlockAck frame may be transmitted in a non-HT PPDU, non-HT duplicate PPDU, HT PPDU, VHT PPDU, HE SU PPDU, HE ER SU PPDU, or HE MU PPDU. After the reception of an UL frame requiring acknowledgment, transmission of the DL acknowledgment shall commence after a SIFS, without regard to the busy/idle state of the medium. When an AP transmits an immediate acknowledgment in an HE MU PPDU in response to an A-MPDU sent in an HE TB PPDU, the AP should send it within the 20 MHz channel(s) where the pre-HE modulated fields of the HE TB PPDU sent by the STA are located. The immediate acknowledgment is an Ack frame, Compressed BlockAck frame, or Multi-STA BlockAck frame.

Source: IEEE 802.11 ax, Page 240 of 766.



Source: IEEE 802.11 ax, Page 241 of 766.

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)

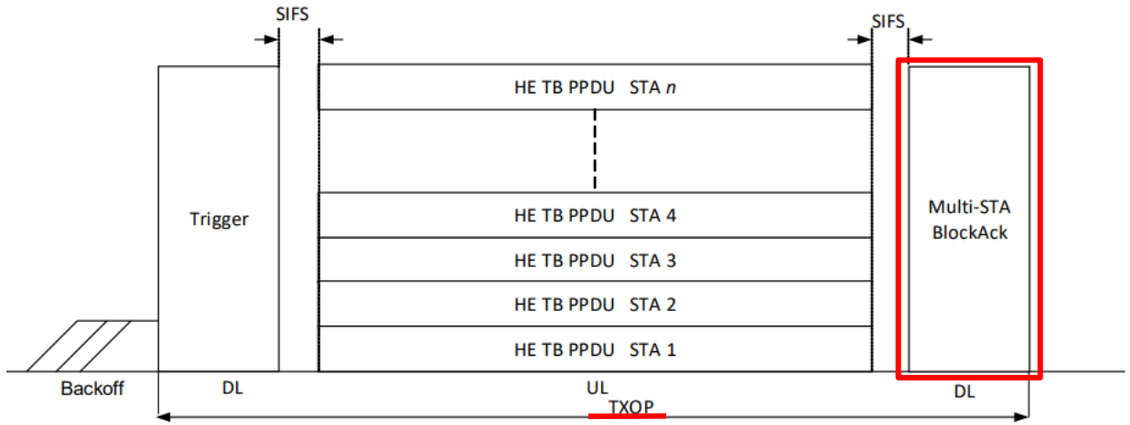


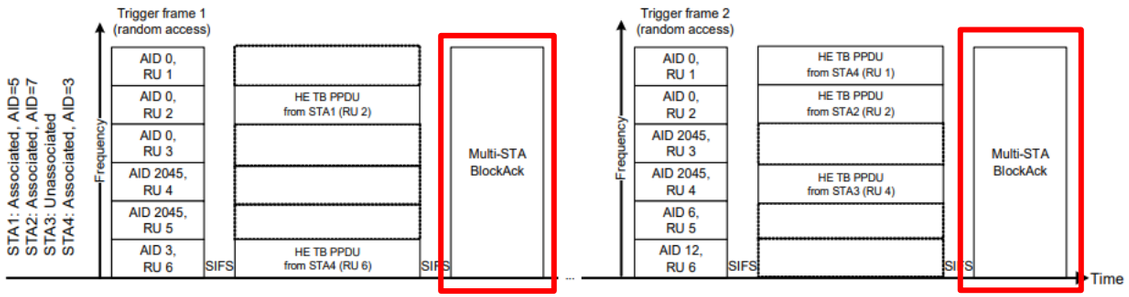
Figure 10-14c—Example of UL MU transmissions with immediate Multi-STA BlockAck frame acknowledging MPDUs

Source: IEEE 802.11 ax, Page 241 of 766.

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)

26.5.4.3 Transmission procedure for UORA

In this subclause, the transmit procedure using RA-RUs is described with respect to UORA parameters. The procedure is also illustrated in Figure 26-6.



After Trigger frame 1 reception

	STA 1	STA 2	STA 3	STA 4
	Initial OBO = 3	Initial OBO = 5	Initial OBO = 4	Initial OBO = 2
RU 1 (AID = 0)	OBO – 3 = 0 (Randomly pick one of the random access RUs)	OBO – 3 = 2	-	OBO = 2
RU 2 (AID = 0)				
RU 3 (AID = 0)				
RU 4 (AID = 2045)	-	-	OBO – 2 = 2	-
RU 5 (AID = 2045)	-	-		-
RU 6	-	-	-	Use this RU
	Select new OBO value	Resume OBO in next Trigger frame	Resume OBO in next Trigger frame	OBO unchanged

After Trigger frame 2 reception

	STA 1	STA 2	STA 3	STA 4
	New OBO = 4	OBO = 2	OBO = 2	OBO = 2
RU 1 (AID = 0)	OBO – 2 = 2	OBO – 2 = 0 (Randomly pick one of the random access RUs)	-	OBO – 2 = 0 (Randomly pick one of the random access RUs)
RU 2 (AID = 0)			-	
RU 3 (AID = 2045)	-	-	OBO – 2 = 0 (Randomly pick one of the random access RUs)	-
RU 4 (AID = 2045)	-	-		-
RU 5	-	-	-	-
RU 6	-	-	-	-
	Resume OBO in next Trigger frame	Select new OBO value	Select new OBO value	Select new OBO value

Figure 26-6—Illustration of UORA procedure

Source: IEEE 802.11 ax, Page 360 of 766.

The MU acknowledgment procedure for UORA follows the procedure as defined in 10.3.2.13.3.

If a non-AP STA transmits an HE TB PPDU that contains a frame that solicits an immediate response in an RA-RU and the expected response is not received, the transmission is considered unsuccessful. Otherwise, the transmission is considered successful. After each successful HE TB PPDU transmission in an RA-RU, a

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)

Source: IEEE 802.11 ax, Page 361 of 766.

— An HE STA that receives an A-MPDU that does not include a tagged MPDU but does include one or more untagged MPDUs that are QoS Data frames with Normal Ack or Implicit BAR ack policy belonging to the same block ack agreement may generate a Multi-STA BlockAck frame as follows:

  — If all MPDUs in the A-MPDU are received successfully, then the recipient may follow the procedure defined in the *all ack context* [described in item a) below in this subclause].

  — Otherwise, the recipient shall follow the procedure defined in the *block ack context* [described in item d) below in this subclause].

Source: IEEE 802.11 ax, Page 330 of 766

a) *All ack context:* If the originator had set the All Ack Support subfield in the HE Capabilities element to 1, then the recipient may set the Ack Type field to 1 and the TID subfield to 14 to indicate the reception of all the MPDUs carried in the eliciting A-MPDU or multi-TID A-MPDU. Otherwise, the recipient shall not set the Ack Type field to 1 and the TID subfield to 14. The Multi-STA BlockAck frame shall contain only one Per AID TID Info field addressed to an originator in the Multi-STA BlockAck frame. The recipient determines that all the MPDUs carried in the eliciting A-MPDU were received if there were no MPDU delimiter CRC errors and no MPDU FCS errors in that A-MPDU.

Source: IEEE 802.11 ax, Page 331 of 766

d) *Block ack context:* The recipient shall set the Ack Type field to 0 and the TID field of a Per AID TID Info field to the TID value of MPDUs requesting block acknowledgment that are carried in the eliciting A-MPDU or multi-TID A-MPDU.

The Multi-STA BlockAck frame may contain multiple occurrences of these Per AID TID Info fields addressed to an originator, one for each MPDU that is requesting block acknowledgment. In such cases, the Block Ack Starting Sequence Control and Block Ack Bitmap fields shall be set according to 10.25.6 for each block ack session and according to 26.3 for each block ack session with dynamic fragmentation.

The allowed values for the TID field in this context are 0 to 7 (for indicating block acknowledgment of QoS Data frames).

Variable bitmap lengths may be included in the Per AID TID Info field when the originator and recipient negotiate their use as defined in 26.4.3.

Source: IEEE 802.11 ax, Page 331 of 766

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)
[1E] modifying transmission parameters for the transmission over the communication channel, if a feedback transmission is detected while monitoring the feedback channel, a duration of the feedback transmission being smaller than duration of the transmission over the communication channel; data being received over the communication channel;	According to 802.11ax, a non-AP STA accused device transmits an HE TB PPDU and waits for a defined Timeout interval to determine whether the transmission was successful. This interval is calculated as aSIFSTime + aSlotTime + aRxPHYStartDelay. (*See, e.g.*, 802.11-2021 at p. 1659.) After transmitting an MPDU (carried in PPDUs such as HE TB PPDU), if a PHY-RXSTART.indication is received, the non-AP STA waits for a corresponding response before PHY-RXEND.indication to confirm transmission success. The receipt of a valid response frame (e.g., Block Ack, Multi-STA Block Ack) from an addressed AP/STA before the PHY-RXEND.indication is treated as a successful transmission. However, if the Block Ack includes information indicating that portions of the transmitted data were not successfully received, the transmission is treated as partially unsuccessful. Similarly, the reception of any other response frame that deviates from the expected feedback, or the absence of any response, is treated as a failed transmission. In such cases, the non-AP STA follows the retransmission procedure by updating the Optimized Contention Window (OCW) duration and/or modifying other transmission parameters, such as incrementing the retry counter, or modifying the modulation and coding scheme (MCS), transmit power, or RU allocation to optimize the transmissions (i.e., modifying transmission parameters for the transmission over the communication channel, if a feedback transmission is detected while monitoring the feedback channel). Since the response PPDU frame (i.e., feedback transmission) is received within an interval calculated as aSIFSTime + aSlotTime + aRxPHYStartDelay, the "duration of the feedback transmission is smaller than the duration of the transmission over the communication channel." Additionally, non-AP STAs receive data (e.g., trigger frames) over the communication channel from the AP containing scheduling information for their uplink communication, including resource unit (RU) allocation for participating non-AP STAs (i.e., data being received over the communication channel). *See, e.g.*,

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)
	After transmitting an MPDU that requires an Ack or BlockAck frame as a response (see Annex G), the STA shall wait for an AckTimeout interval, with a value of aSIFSTime + aSlotTime + aRxPHYStartDelay, starting at the PHY-TXEND.confirm primitive. If a PHY-RXSTART.indication primitive does not occur during the AckTimeout interval, the STA concludes that the transmission of the MPDU has failed, and this STA shall invoke its backoff procedure upon expiration of the AckTimeout interval. **Source:** 802.11-2021 at p. 1659. The MU acknowledgment procedure for UORA follows the procedure as defined in 10.3.2.13.3. If a non-AP STA transmits an HE TB PPDU that contains a frame that solicits an immediate response in an RA-RU and the expected response is not received, the transmission is considered unsuccessful. Otherwise, the transmission is considered successful. After each successful HE TB PPDU transmission in an RA-RU, a **Source:** IEEE 802.11 ax, Page 361 of 766. non-AP HE STA shall set the value of OCW to the *OCWmin* obtained from the most recent *OCWmin* indicated in the UORA Parameter Set element from the HE AP or the default (if UORA Parameter Set element was not received) and shall initialize its OBO counter to an integer value randomly selected from a uniform distribution in the range 0 to OCW. The non-AP STA shall follow the retransmission procedure defined in 26.5.4.4 if the transmission is not successful. **Source:** IEEE 802.11 ax, Page 362 of 766.

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)

26.5.4.4 Retransmission procedure for UORA

A non-AP STA whose HE TB PPDU transmission sent in an RA-RU of a Trigger frame is unsuccessful, may attempt to retransmit the failed PPDU using EDCA or as a response to a Trigger frame.

If the HE TB PPDU is not successfully transmitted in the selected RA-RU, then the non-AP STA shall update its OCW to 2 × OCW + 1 when the OCW is less than the value of *OCWmax*, and shall randomly select its OBO counter in the range of 0 and OCW. Once the OCW reaches *OCWmax* for successive retransmission attempts, the OCW shall remain at the value of *OCWmax* until the OCW is reset as described in 26.5.4.3.

A non-AP STA shall update its OCW value under the condition that the updated OCW remains in the range *OCWmin* to *OCWmax* obtained from the most recently received UORA Parameter Set element (see 9.4.2.250). If the updated OCW becomes greater than *OCWmax* as a consequence of receiving a modified UORA Parameter Set element, then the non-AP STA shall set the value of OCW to the new *OCWmax* value.

Source: IEEE 802.11 ax, Page 362 of 766.

For the purposes of this subclause, transmission failure of an MPDU is defined as follows:

- After transmitting an MPDU (even if it is carried in an A-MPDU, ~~or~~ as part of a VHT or S1G MU PPDU, or as part of an HE MU PPDU that is sent using TXVECTOR parameter NUM_USERS > 1) that requires an immediate response:
  - The STA shall wait for a timeout interval of duration aSIFSTime + aSlotTime + aRxPHYStartDelay, starting when the MAC receives a PHY-TXEND.confirm primitive. If a PHY-RXSTART.indication primitive does not occur during the timeout interval, the transmission of the MPDU has failed.
  - If a PHY-RXSTART.indication primitive does occur during the timeout interval, the STA shall wait for the corresponding PHY-RXEND.indication primitive to recognize a valid response MPDU (see Annex G) that either does not have a TA field or is sent by the recipient of the MPDU requiring a response. If anything else, including any other valid frame, is recognized, the transmission of the MPDU has failed.

Source: IEEE 802.11 ax, Page 362 of 766.

Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)
	An HE AP sends a Trigger frame to initiate UL MU operation using UL OFDMA or UL MU-MIMO transmissions or a frame containing a TRS Control subfield to initiate UL OFDMA transmissions. The frame initiating these transmissions in the uplink direction is a triggering frame. The triggering frame identifies non-AP STAs participating in UL MU operation and assigns RUs and/or spatial streams to these STAs. Multi-STA BlockAck frames can be used by the AP to acknowledge the frames transmitted by multiple non-AP STAs. The scheduling of these Trigger frames can be set up between a non-AP STA and the AP using TWT operation to save power and reduce collisions. **Source:** IEEE 802.11 ax, Page 48 of 766.
[1F] determining communication channel information from the received data; the communication channel information comprising a status of transmissions on the communication channel; and determining, utilizing the communication channel information, whether to transmit.	According to 802.11 ax, non-AP STA accused devices used the received data (e.g., a trigger frame) to determine communication channel information. The channel information may include the identity of non-AP STAs participating in UL communication and their scheduling details such as resource unit (RU) allocation to STAs for uplink communication (i.e., determining communication channel information from the received data). From the received data, the non-AP STA accused devices determine the status of the communication channel, assessing whether it is active or idle (i.e., the communication channel information comprising a status of transmissions on the communication channel). Based on this communication channel information, the non-AP STA accused devices then determine whether or not to transmit based on assigned resources. An HE AP sends a Trigger frame to initiate UL MU operation using UL OFDMA or UL MU-MIMO transmissions or a frame containing a TRS Control subfield to initiate UL OFDMA transmissions. The frame initiating these transmissions in the uplink direction is a triggering frame. The triggering frame identifies non-AP STAs participating in UL MU operation and assigns RUs and/or spatial streams to these STAs. Multi-STA BlockAck frames can be used by the AP to acknowledge the frames transmitted by multiple non-AP STAs. The scheduling of these Trigger frames can be set up between a non-AP STA and the AP using TWT operation to save power and reduce collisions. **Source:** IEEE 802.11 ax, Page 48 of 766.

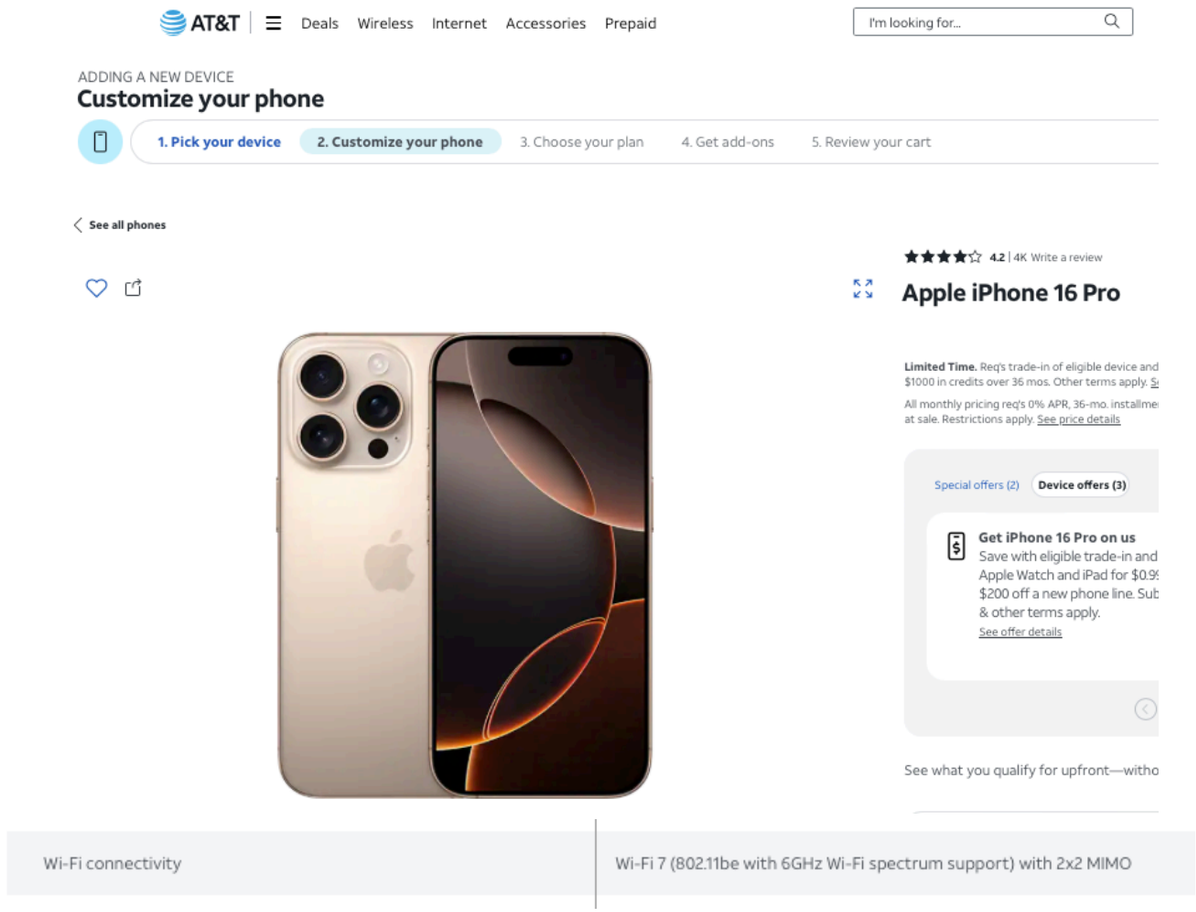
Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)
	If the CS Required subfield in a Trigger frame is 1, then the non-AP STA shall consider the status of the CCA [using energy detect defined in 27.3.20.6.2 and the virtual carrier sense (NAV)] during the SIFS between the Trigger frame and the PPDU sent in response to the Trigger frame. In this case, the non-AP STA shall sense the medium using energy detect after receiving the PPDU that contains the Trigger frame (i.e., during the SIFS), and it shall perform the energy detect at least in the subchannel that contains the non-AP STA's UL allocation, where the sensed subchannel consists of one or more 20 MHz channels. The non-AP STA may transmit the solicited PPDU if the 20 MHz channels containing the RUs allocated in the Trigger frame are considered idle. If the non-AP STA detects that the 20 MHz channels containing the allocated RUs are not all idle, then the non-AP STA shall not transmit. **Source:** IEEE 802.11 ax, Page 356 of 766.

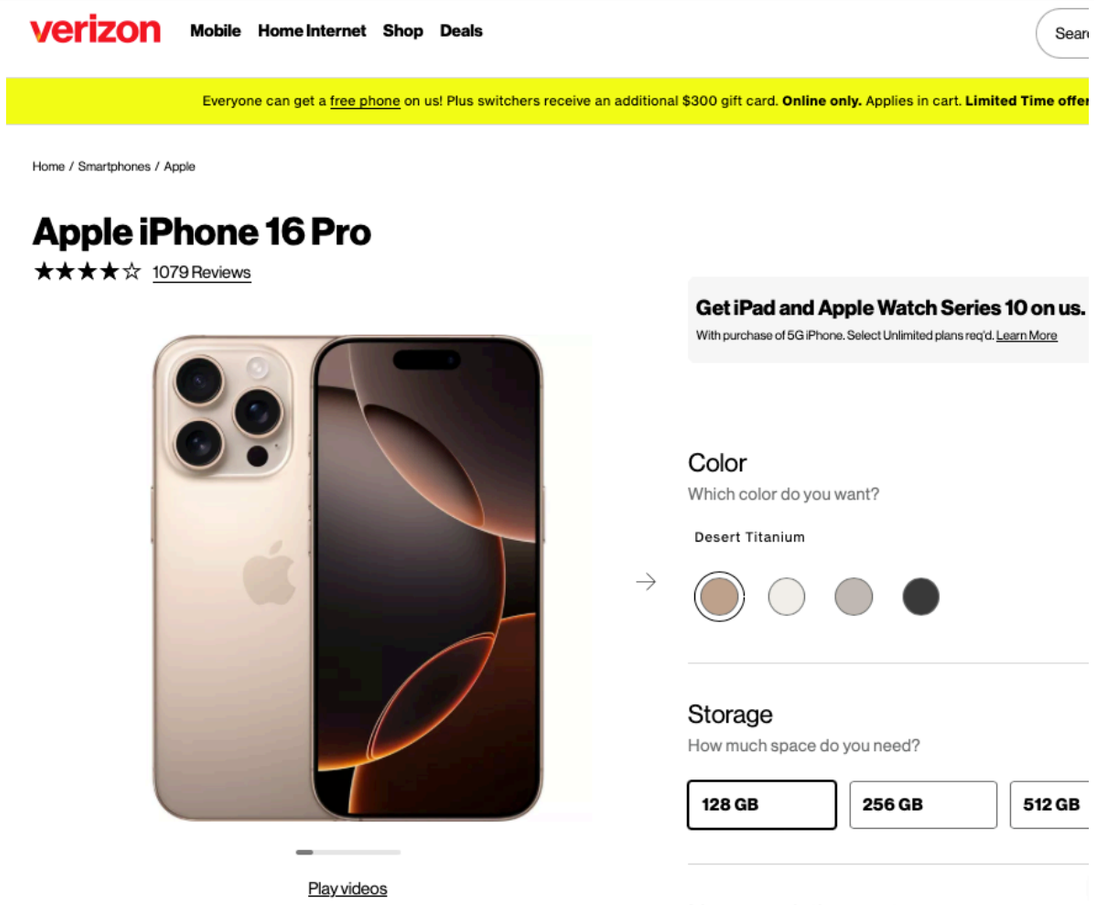
Claim	Accused Products (AT&T Wi-Fi 6/7 Devices)
	A non-AP HE STA may support the following: — Transmission of an HE MU PPDU with a single RU spanning the entire PPDU bandwidth or a 20 MHz HE MU PPDU with a single 106-tone RU in the primary 20 MHz channel. — 40 MHz channel width in the 2.4 GHz band (transmit and receive). If 40 MHz channel width in the 2.4 GHz band is supported, then all RU sizes and locations applicable to 40 MHz channel width are supported, except for a 20 MHz-only non-AP HE STA in which case the 40 MHz channel width and all RU sizes and locations of 40 MHz channel width in 2.4 GHz band are not applicable. — 160 MHz and 80+80 MHz channel width and 2×996-tone RU size applicable to the 160 MHz and 80+80 MHz channel width in the 5 GHz and 6 GHz bands (transmit and receive), except for a 20 MHz-only non-AP HE STA in which case the 160 MHz and 80+80 MHz channel width and 2×996-tone RU size in the 5 GHz and 6 GHz bands are not applicable. — MU-MIMO reception on an RU in an HE MU PPDU where the RU does not span the entire PPDU bandwidth (DL MU-MIMO within OFDMA). The maximum number of spatial streams per user in the DL MU-MIMO within OFDMA transmission that the non-AP STA can receive shall be a minimum of 4 and the maximum number of spatial streams supported for reception of HE SU PPDUs. The total number of spatial streams (across all users) in the DL MU-MIMO within OFDMA transmission that the non-AP STA can receive shall be at least 4. — Reception of an HE MU PPDU with up to 8 HE-LTF OFDM symbols, where the RU allocated to the non-AP STA does not span the entire PPDU bandwidth. — MU-MIMO transmission on an RU in an HE TB PPDU where the RU spans the entire PPDU bandwidth (UL MU-MIMO). If supported, then the non-AP HE STA shall support transmitting UL MU-MIMO where the total space-time streams summed across all users is less than or equal to 8. — MU-MIMO transmission on an RU in an HE TB PPDU where the RU does not span the entire PPDU bandwidth (UL MU-MIMO within OFDMA). If supported, then the non-AP HE STA shall support transmitting UL MU-MIMO where the total space-time streams summed across all users is less than or equal to 8. **Source:** IEEE 802.11 ax, Page 469 of 766.

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)
[16Pre]. A transmitter system comprising: [16A] a transmitter/receiver subsystem comprising:	AT&T provides high speed internet service, including Wi-Fi 6 (and later) routers and access points (APs), and also provide/sell the Wi-Fi 6 (and later) compatible routers/devices. AT&T's Internet and Wi-Fi Services include routers/devices have the capability to work as an Access Point (AP) by creating a Wi-Fi 6 (and later) network. AT&T configures these routers/devices to transmit signals over the communication channel and to receive signals

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)
a transmitter/receiver portion capable of transmitting information over a communication channel and of receiving information transmitted over a feedback channel; said transmitter/receiver subsystem be capable of accessing the communication channel and the feedback channel through a physical layer; said transmitter/receiver subsystem capable of transmitting multiple packets simultaneously and successfully receiving multiple packets over the communication channel; and	transmitted by non-AP STA on the same channel. These routers/devices support essential features like carrier sensing, OFDMA and MIMO. Further, both providers also offer Wi-Fi network/infrastructure supporting Wi-Fi 6 (and later) access points. The APs all include a transmitter/receiver subsystem, which may include hardware/software implementing portions of the physical (PHY) layer described below and an RF front end for transmitting and receiving packets over a communication channel. In addition, client devices sold by AT&T (e.g., smartphones) can also serve as APs when operating as a "hotspot" using the device's built-in capability to provide a compatible Wi-Fi network to other devices. According to 802.11ax, an Access Point (AP) can simultaneously transmit downlink data to multiple non-AP STAs using DL MU-MIMO, downlink OFDMA, or a combination of both, within transmission opportunities (TXOP) configured through trigger frames. As specified in 802.11ax, an AP transmits A-MPDUs addressed to multiple non-AP STAs in a HE MU PPDU over downlink resource units (RUs) allocated for downlink data (i.e., a transmitter/receiver portion capable of transmitting information over a communication channel), the AP receives acknowledgments from the addressed non-AP STAs through response frames (e.g., Block Ack frame) transmitted over the uplink resource units allocated for Block Ack frame (i.e., receiving information transmitted over a feedback channel). A-MPDUs carried in HE MU PPDU transmitted by the AP in the downlink direction, using DL MU-MIMO, downlink OFDMA, or a combination of both, are successfully received by non-AP stations and acknowledged by Block Ack frames, the Block Ack frames are transmitted by participating non-AP stations and received by the AP. (i.e., said transmitter/receiver subsystem capable of transmitting multiple packets simultaneously and successfully receiving multiple packets over the communication channel;).

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)
	In addition, the physical layer (PHY) of the APs performs a clear channel assessment procedure (Clear Channel Assessment (CCA) before initiating transmission of PPDU (e.g. transmission HE MU PPDU carrying multiple MPDUs or HE TB PPDUs carrying Block Ack Frame) (i.e., said transmitter/receiver subsystem be capable of accessing the communication channel and the feedback channel through a physical layer). *See, e.g.*, Currently, from AT&T **NEXT GEN WI-FI 6 AND OUR NEW GATEWAY** A new and improved Wi-Fi is here, setting the standard for how we connect Wi-Fi is everywhere, and we use it for nearly everything these days. From cars to coffee makers, our reliance on wireless internet has grown exponentially in recent years. We need the strongest, and the smartest, Wi-Fi we can get, and that is especially true in more populated areas. More people mean more need, and more need means more data being exchanged. So, what is next in the evolution of the very thing that keeps us moving? Introducing Wi-Fi 6, the next-generation in wireless internet. While it offers more speed, it can also provide better performance in densely populated areas, from concerts and sports arenas to your multi-family homes and buildings. Wi-Fi 6 has launched, but its true power is still yet to be felt. **Source:** https://more.att.com/currently/this-month/fiber/next-gen-wi-fi-6-and-our-new-gateway

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)
	 **Source:** https://www.att.com/buy/phones/apple-iphone-16-pro.html

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)
	 **Source:** https://www.verizon.com/smartphones/apple-iphone-16-pro/

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)
	27.3.1.1 MU transmission The MU transmissions include DL MU transmissions and UL MU transmissions. DL MU transmission allows an AP to simultaneously transmit information to more than one non-AP STA. For a DL MU transmission, the AP uses the HE MU PPDU format and employs either DL OFDMA or DL MU-MIMO, or a mixture of both. UL MU transmission allows an AP to simultaneously receive information from more than one non-AP STA. UL MU transmissions are preceded by a triggering frame from the AP. The non-AP STAs transmit using the HE TB PPDU format and employ either UL OFDMA or UL MU-MIMO, or a mixture of both. **Source:** IEEE 802.11 ax, Page 497 of 766. **26.5.1 HE DL MU operation** **26.5.1.1 General** HE DL MU operation allows an AP to transmit simultaneously to one or more non-AP STAs in DL OFDMA, DL MU-MIMO, or both. **Source:** IEEE 802.11 ax, Page 338 of 766. The HE PHY extends the maximum number of users supported for DL MU-MIMO transmissions to 8 users per resource unit (RU) and provides support for DL and UL orthogonal frequency division multiple access (OFDMA) as well as for UL MU-MIMO. Both DL and UL MU-MIMO transmissions are supported on portions of the PPDU bandwidth (on resource units greater than or equal to 106 tones). In an MU-MIMO resource unit, there is support for up to 8 users with up to 4 space-time streams per user with the total across all users not exceeding 8 space-time streams.

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)

10.3.2.13.2 Acknowledgment procedure for DL MU PPDU in MU format

A non-AP STA shall not set the ack policy to HETP Ack.

A non-AP STA that is the recipient, within an HE MU PPDU, of a QoS Data frame or QoS Null frame with HETP Ack ack policy, of an MU-BAR Trigger frame or a GCR MU-BAR Trigger frame, or of a Management frame that solicits acknowledgment, shall send the immediate response according to the scheduling information that is carried either in the Trigger frame(s) or TRS Control subfield. If a Basic Trigger frame (see 9.3.1.22) or frame carrying a TRS Control subfield (see 9.2.4.6a.1) is not received, then the STA shall not respond.

Source: IEEE 802.11 ax, Page 240 of 766.

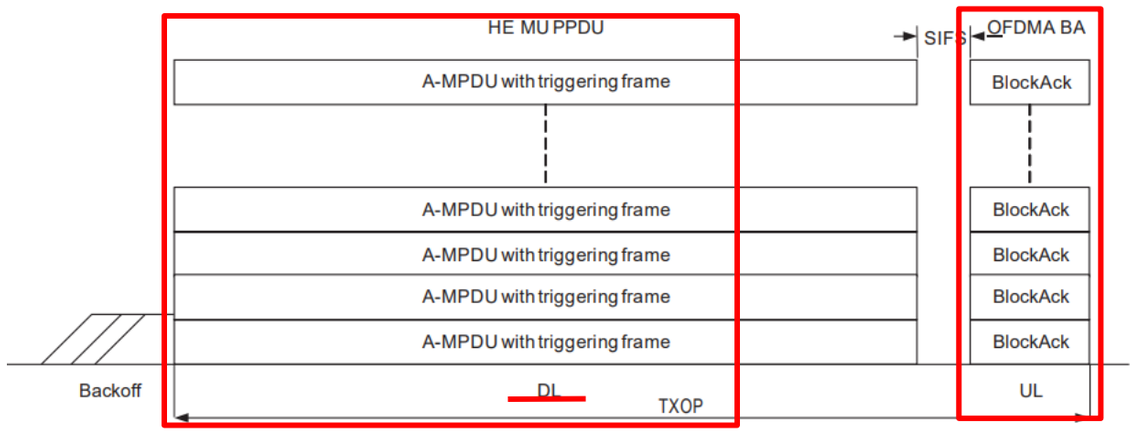


Figure 10-14a—Example of HE MU PPDU transmission with immediate UL OFDMA acknowledgment

Source: IEEE 802.11 ax, Page 240 of 766.

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)

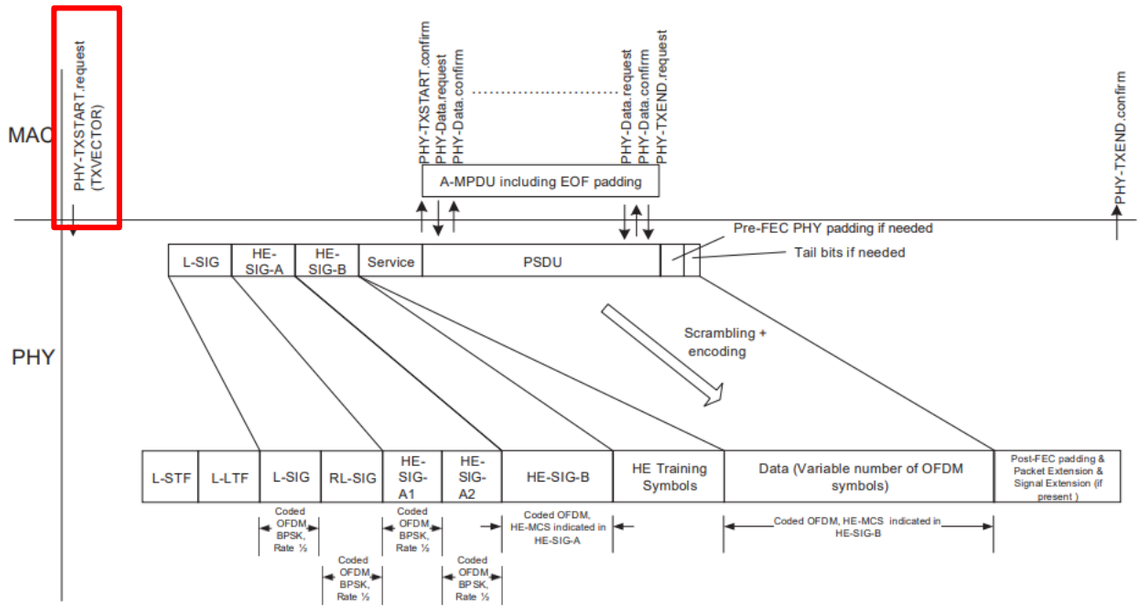


Figure 27-56—PHY transmit procedure for an HE MU PPDU

Source: IEEE 802.11 ax, Page 649 of 766.

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)
	In all options, in order to transmit data, the MAC generates a PHY-TXSTART.request primitive, which causes the PHY entity to enter the transmit state. Further, the PHY is set to operate at the appropriate frequency through station management via the PLME, as specified in 27.4. Other transmit parameters, such as HE-MCS, coding types, and transmit power, are set via the PHY-SAP using the PHYTXSTART.request(TXVECTOR) primitive, as described in 27.2.2. After transmitting a PPDU that carries a Trigger frame, the MAC sublayer issues a PHY-TRIGGER.request with a TRIGVECTOR parameter that provides the PHY entity with the information needed to demodulate the expected HE TB PPDU response. The remainder of this subclause applies to the first four options. The PHY indicates the state of the primary channel and other channels (if any) via the PHY-CCA.indication primitive (see 21.3.18.5 and 8.3.5.12). Transmission of the PPDU shall be initiated by the PHY after receiving the PHY-TXSTART.request(TXVECTOR) primitive. The TXVECTOR parameters for the PHY-TXSTART.request primitive are specified in Table 27-1. **Source:** IEEE 802.11 ax, Page 650 of 766. **17.3.11 Transmit PHY** The transmit PHY is shown in Figure 17-17. In order to transmit data, the PHY-TXSTART.request primitive shall be enabled so that the PHY entity shall be in the transmit state. Further, the PHY shall be set to operate at the appropriate frequency through STA management via the PLME. Other transmit parameters, such as DATARATE and TX power, are set via the PHY SAP with the PHY-TXSTART.request(TXVECTOR) primitive, as described in 17.2.2. **Source:** IEEE 802.11 - 2020, Page 2838 of 4379.

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)
	The PHY shall indicate a clear channel by issuing a PHY-CCA.indication(IDLE) primitive. The MAC considers this indication before issuing the PHY-TXSTART.request primitive. Transmission of the PPDU shall be initiated after receiving the PHY-TXSTART.request(TXVECTOR) primitive. The TXVECTOR elements for the PHY-TXSTART.request primitive are the PHY header parameters DATARATE, SERVICE, and LENGTH and the PHY parameters TXPWR_LEVEL_INDEX and TIME_OF_DEPARTURE_REQUESTED. **Source:** IEEE 802.11 - 2020, Page 2839 of 4379. **17.3.6 CCA** The PHY shall provide the capability to perform CCA and report the result to the MAC. The CCA mechanism shall detect a "medium busy" condition with requirements specified in 17.3.10.6 and 17.3.12. The PHY issues the PHY-CCA.indication primitive to provide this medium status report to the MAC. **Source:** IEEE 802.11-2020, Page 2827 of 4379. The PHY shall indicate a clear channel by issuing a PHY-CCA.indication(IDLE) primitive. The MAC considers this indication before issuing the PHY-TXSTART.request primitive. Transmission of the PPDU shall be initiated after receiving the PHY-TXSTART.request(TXVECTOR) primitive. The TXVECTOR elements for the PHY-TXSTART.request primitive are the PHY header parameters DATARATE, SERVICE, and LENGTH and the PHY parameters TXPWR_LEVEL_INDEX and TIME_OF_DEPARTURE_REQUESTED. **Source:** IEEE 802.11 - 2020, Page 2839 of 4379.
[16B] a scheduling component capable of scheduling transmission of information over the communication channel; and	According to the 802.11 ax standard, a trigger frame such as MU-RTS is used to schedule the transmission of information for participating non-AP stations. APs include hardware and/or software that is responsible for trigger frame is the required scheduling component. (i.e., a scheduling component capable of scheduling the transmission of information over the communication channel).

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)
	See, e.g.,

26.2.6 MU-RTS TriggerICTS frame exchange procedure

26.2.6.1 General

The MU-RTS Trigger/CTS frame exchange procedure allows an AP to initiate a TXOP and protect the TXOP frame exchanges. An AP may transmit an MU-RTS Trigger frame to solicit simultaneous CTS frame responses from one or more non-AP STAs.

Figure 26-1 shows an example of the exchange of MU-RTS and simultaneous CTS responses to protect the DL MU PPDU and the acknowledgment responses.

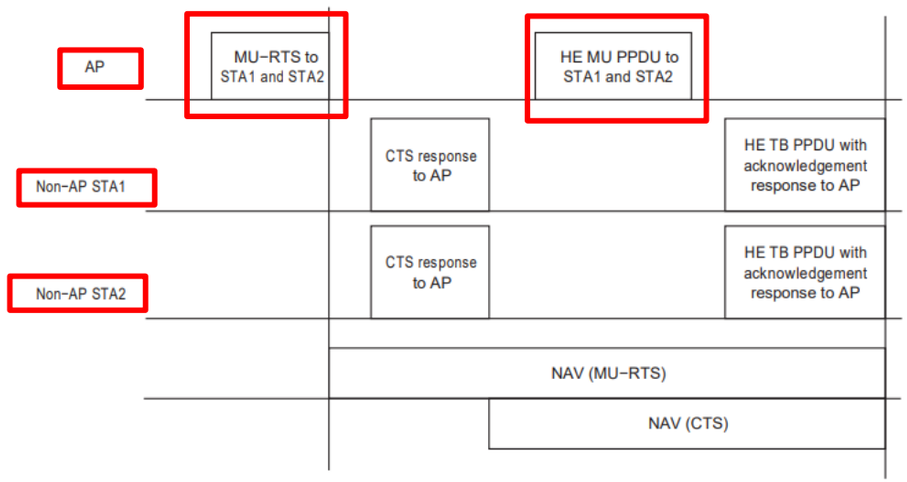
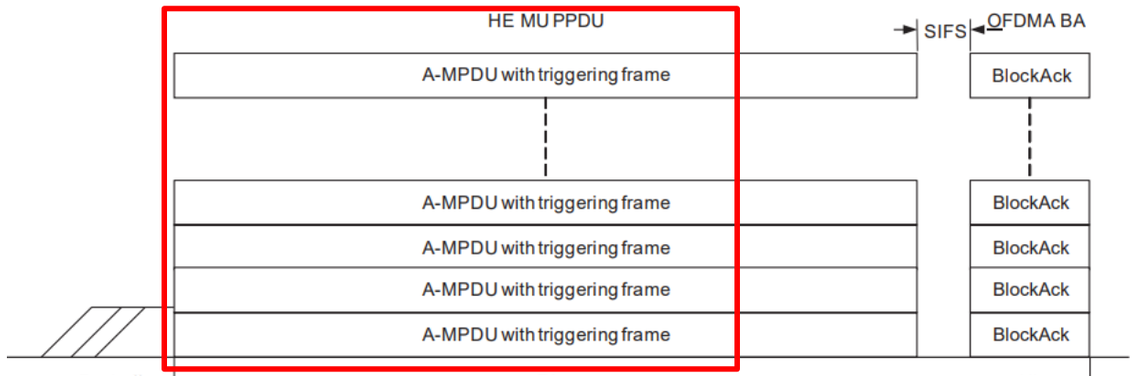


Figure 26-1—Example of MU-RTSICTSIDL MU PPDUIAcknowledgment Response and NAV setting

Source: IEEE 802.11 ax, Page 316 of 766.

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)
	 **Figure 10-14a—Example of HE MU PPDU transmission with immediate UL OFDMA acknowledgment** **Source:** IEEE 802.11 ax, Page 240 of 766.
[16C] a transmitter/receiver control subsystem modifying transmission parameters for the transmission over the communication channel and of determining whether information was successfully transmitted;	The 802.11ax standard specifies a method for managing Wi-Fi network transmissions, where an AP sends a HE MU PPDU containing A-MPDUs to participating non-AP STAs and waits for a defined timeout interval to verify the success of the transmission. The timeout interval is calculated as aSIFSTime + aSlotTime + aRxPHYStartDelay. The APs include a transmitter/receiver control subsystem, e.g., hardware and/or software implementing the functionality described below. After transmitting an MPDU (carried in PPDUs such as HE MU PPDU), if a PHY-RXSTART.indication is received, the AP waits for a corresponding response before PHY-RXEND.indication to confirm transmission success. The receipt of a valid response frame (e.g. Block Ack, Multi-STA Block Ack), from an addressed non-AP station, before the PHY-RXEND.indication is treated as a successful transmission, whereas reception of any other response than the expected is considered as the failed transmission (i.e., determining whether information was

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)
	successfully transmitted), and subsequently the AP follows the backoff procedure and initiate retransmission (i.e., a transmitter/receiver control subsystem modifying transmission parameters for the transmission over the communication channel). *See, e.g.*, **10.3.2.13.2 Acknowledgment procedure for DL MU PPDU in MU format** A non-AP STA shall not set the ack policy to HETP Ack. A non-AP STA that is the recipient, within an HE MU PPDU, of a QoS Data frame or QoS Null frame with HETP Ack ack policy, of an MU-BAR Trigger frame or a GCR MU-BAR Trigger frame, or of a Management frame that solicits acknowledgment, shall send the immediate response according to the scheduling information that is carried either in the Trigger frame(s) or TRS Control subfield. If a Basic Trigger frame (see 9.3.1.22) or frame carrying a TRS Control subfield (see 9.2.4.6a.1) is not received, then the STA shall not respond. **Source:** IEEE 802.11 ax, Page 240 of 766.

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)

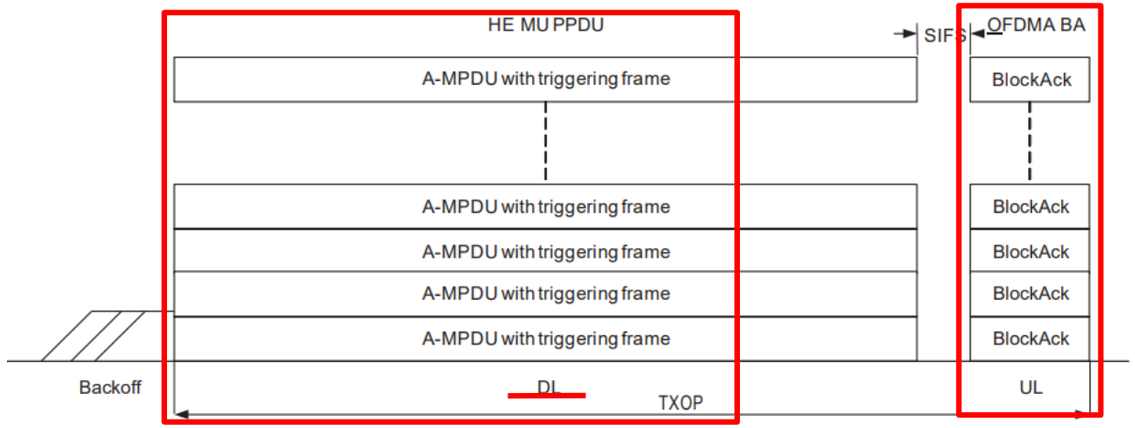


Figure 10-14a—Example of HE MU PPDU transmission with immediate UL OFDMA acknowledgment

Source: IEEE 802.11 ax, Page 240 of 766.

The AP shall follow the EDCA procedure defined in 10.23 and the following additional rules:

— If at least one of the frame exchanges in HE DL MU operation requires an immediate response (i.e., the AP includes at least one triggering frame) and if the AP receives an immediate response with at least one correct MPDU from at least one of the solicited STAs, the frame exchange is successful.

— If at least one of the frame exchanges in HE DL MU operation requires an immediate response (i.e., the AP includes at least one triggering frame) and if the AP receives no immediate response, the frame exchange is not successful.

Source: IEEE 802.11 ax, Page 338 of 766.

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)
	10.23.2.2 EDCA backoff procedure ***Change the second paragraph in 10.23.2.2 as follows:*** For the purposes of this subclause, transmission failure of an MPDU is defined as follows: — After transmitting an MPDU (even if it is carried in an A-MPDU, ~~or~~ as part of a VHT or S1G MU PPDU, or as part of an HE MU PPDU that is sent using TXVECTOR parameter NUM_USERS > 1) that requires an immediate response: — The STA shall wait for a timeout interval of duration aSIFSTime + aSlotTime + aRxPHYStartDelay, starting when the MAC receives a PHY-TXEND.confirm primitive. If a PHY-RXSTART.indication primitive does not occur during the timeout interval, the transmission of the MPDU has failed. — If a PHY-RXSTART.indication primitive does occur during the timeout interval, the STA shall wait for the corresponding PHY-RXEND.indication primitive to recognize a valid response MPDU (see Annex G) that either does not have a TA field or is sent by the recipient of the MPDU requiring a response. If anything else, including any other valid frame, is recognized, the transmission of the MPDU has failed. — The nonfinal (re)transmission of an MPDU that is delivered using the GCR unsolicited retry retransmission policy (10.23.2.12.2) is defined to be a failure. — In all other cases, the transmission of the MPDU has not failed. **Source:** IEEE 802.11 ax, Page 259 of 766.
[16D]. said transmitter/receiver control subsystem determining whether signal energy of transmissions on said communication channel exceeds a predetermined amount,	Before initiating a transmission (ex. transmission of HE MU PPDU), the Clear Channel Assessment (CCA) procedure is performed to check for a PHY-CCA.indication(IDLE/BUSY). During the CCA process, the AP measures the signal energy level on the communication channel and compares it to the CCA-ED threshold. If the measured energy exceeds the CCA-ED threshold, the medium is deemed BUSY (i.e., said transmitter/receiver control subsystem determining whether signal energy of transmissions on said communication channel exceeds a predetermined amount,). *See, e.g.*,

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)
	The PHY shall indicate a clear channel by issuing a PHY-CCA.indication(IDLE) primitive. The MAC considers this indication before issuing the PHY-TXSTART.request primitive. Transmission of the PPDU shall be initiated after receiving the PHY-TXSTART.request(TXVECTOR) primitive. The TXVECTOR elements for the PHY-TXSTART.request primitive are the PHY header parameters DATARATE, SERVICE, and LENGTH and the PHY parameters TXPWR_LEVEL_INDEX and TIME_OF_DEPARTURE_REQUESTED. **Source:** IEEE 802.11 - 2020, Page 2839 of 4379. **21.3.18.5.2 CCA sensitivity for operating classes requiring CCA-ED** For the operating classes requiring CCA-Energy Detect (CCA-ED), the PHY shall also indicate a medium busy condition when CCA-ED detects a channel busy condition. For improved spectrum sharing, CCA-ED is required in some bands. The behavior class indicating CCA-ED is given in Table D-2. The operating classes requiring the corresponding CCA-ED behavior class are given in E.1. The PHY of a STA that is operating within an operating class that requires CCA-ED shall operate with CCA-ED. CCA-ED shall detect a channel busy condition when the received signal strength exceeds the CCA-ED threshold as given by dot11OFDMEDThreshold for the primary 20 MHz channel, dot11OFDMEDThreshold for the secondary 20 MHz channel (if present), dot11OFDMEDThreshold + 3 dB for the secondary 40 MHz channel (if present), and dot11OFDMEDThreshold + 6 dB for the secondary 80 MHz channel (if present). The CCA-ED thresholds for the operating classes requiring CCA-ED are subject to the criteria in D.2.5. **Source:** IEEE 802.11 - 2020, Page 3105 of 4379.
[16E]. said transmitter/receiver control subsystem preventing transmission over said communication channel, if it has been determined, by the control	A transmission (e.g., transmission of a HE MU PPDU), is initiated only after receiving a PHY-CCA.indication(IDLE). This means that the transmission will not proceed (i.e., said transmitter/receiver control subsystem preventing transmission over said communication channel) if a PHY-CCA.indication(BUSY) is received, which occurs when the signal energy on the communication channel exceeds the CCA-ED threshold (i.e., if it has been determined, by the control sub-system, that said signal energy exceeds the predetermined amount;).

Claim	Accused Internet with Wi-Fi Services and Related Products (Wi-Fi 6/7 Devices)
sub-system, that said signal energy exceeds the predetermined amount;	*See, e.g.*,

17.3.11 Transmit PHY

The transmit PHY is shown in Figure 17-17. In order to transmit data, the PHY-TXSTART.request primitive shall be enabled so that the PHY entity shall be in the transmit state. Further, the PHY shall be set to operate at the appropriate frequency through STA management via the PLME. Other transmit parameters, such as DATARATE and TX power, are set via the PHY SAP with the PHY-TXSTART.request(TXVECTOR) primitive, as described in 17.2.2.

Source: IEEE 802.11 - 2020, Page 2838 of 4379.

The PHY shall indicate a clear channel by issuing a PHY-CCA.indication(IDLE) primitive. The MAC considers this indication before issuing the PHY-TXSTART.request primitive. Transmission of the PPDU shall be initiated after receiving the PHY-TXSTART.request(TXVECTOR) primitive. The TXVECTOR elements for the PHY-TXSTART.request primitive are the PHY header parameters DATARATE, SERVICE, and LENGTH and the PHY parameters TXPWR_LEVEL_INDEX and TIME_OF_DEPARTURE_REQUESTED.

Source: IEEE 802.11 - 2020, Page 2839 of 4379.

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	21.3.18.5.2 CCA sensitivity for operating classes requiring CCA-ED For the operating classes requiring CCA-Energy Detect (CCA-ED), the PHY shall also indicate a medium busy condition when CCA-ED detects a channel busy condition. For improved spectrum sharing, CCA-ED is required in some bands. The behavior class indicating CCA-ED is given in Table D-2. The operating classes requiring the corresponding CCA-ED behavior class are given in E.1. The PHY of a STA that is operating within an operating class that requires CCA-ED shall operate with CCA-ED. CCA-ED shall detect a channel busy condition when the received signal strength exceeds the CCA-ED threshold as given by dot11OFDMEDThreshold for the primary 20 MHz channel, dot11OFDMEDThreshold for the secondary 20 MHz channel (if present), dot11OFDMEDThreshold + 3 dB for the secondary 40 MHz channel (if present), and dot11OFDMEDThreshold + 6 dB for the secondary 80 MHz channel (if present). The CCA-ED thresholds for the operating classes requiring CCA-ED are subject to the criteria in D.2.5. **Source:** IEEE 802.11 - 2020, Page 3104 of 4379.
[16F]. the control subsystem determining whether to stop transmitting based on received feedback information; received feedback information originates at a receiver receiving and decoding said substantially simultaneously transmitted multiple packets; said received feedback information conveying whether at least one of said substantially simultaneously	According to the 802.11ax standard, an AP transmitting a HE MU PPDU waits for a specified timeout interval to confirm the success of the transmission. This is determined by receiving a valid response frame (e.g. PPDU carrying a Block Ack frame) over the uplink Resource Units (RUs) allocated for transmission of the response frame (e.g. PPDU carrying a Block Ack frame). The PPDU carrying a Block Ack frame is transmitted from respective addressed non-AP station receiving an A-MPDU carried in a HE MU PPDU (i.e., received feedback information originates at a receiver receiving and decoding said substantially simultaneously transmitted multiple packets). The step of successfully receiving addressed A-MPDU carried in a HE MU PPDU comprises both receiving and decoding (i.e., said receiver receiving and decoding simultaneously transmitted multiple packets). Additionally, if a valid response frame (e.g. PPDU carrying a Block Ack frame) is not received from a particular station, and/or any other invalid or unrelated frame is received, the entire transmission will be considered

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transmitted multiple packets, transmitted by said transmitter system, could not be successfully decoded.	unsuccessful and provisions for backoff (e.g., stop transmitting for some duration to delay and retransmit the scheduled transmission) are invoked (i.e., the control subsystem determining whether to stop transmitting based on received feedback information). The failed transmission indicates whether the transmission not being successfully decoded. Thus, the claim limitations "said received feedback information conveying whether at least one of said substantially simultaneously transmitted multiple packets, transmitted by said transmitter system, could not be successfully decoded" is disclosed. **10.3.2.13.2 Acknowledgment procedure for DL MU PPDU in MU format** A non-AP STA shall not set the ack policy to HETP Ack. A non-AP STA that is the recipient, within an HE MU PPDU, of a QoS Data frame or QoS Null frame with HETP Ack ack policy, of an MU-BAR Trigger frame or a GCR MU-BAR Trigger frame, or of a Management frame that solicits acknowledgment, shall send the immediate response according to the scheduling information that is carried either in the Trigger frame(s) or TRS Control subfield. If a Basic Trigger frame (see 9.3.1.22) or frame carrying a TRS Control subfield (see 9.2.4.6a.1) is not received, then the STA shall not respond. **Source:** IEEE 802.11 ax, Page 240 of 766.

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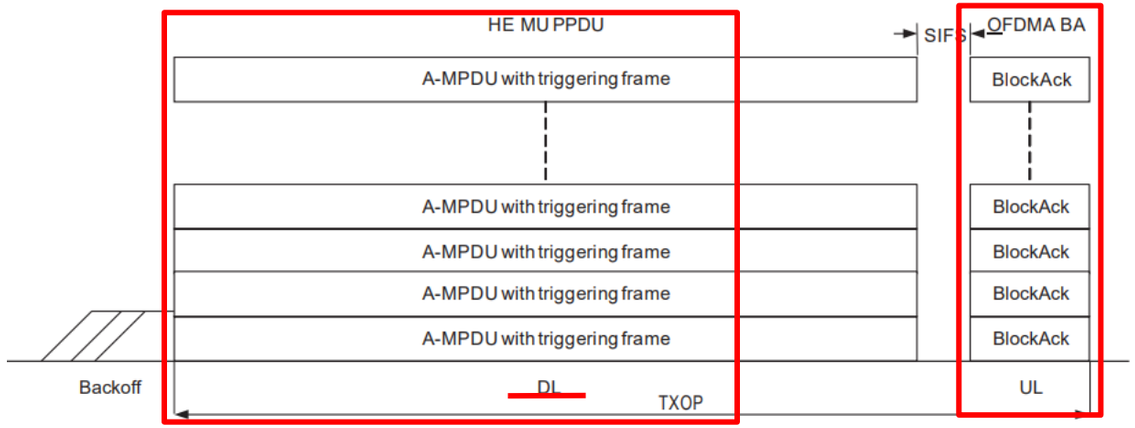

Figure 10-14a—Example of HE MU PPDU transmission with immediate UL OFDMA acknowledgment

Source: IEEE 802.11 ax, Page 240 of 766.

— An HE STA that receives an A-MPDU that does not include a tagged MPDU but does include one or more untagged MPDUs that are QoS Data frames with Normal Ack or Implicit BAR ack policy belonging to the same block ack agreement may generate a Multi-STA BlockAck frame as follows:

  — If all MPDUs in the A-MPDU are received successfully, then the recipient may follow the procedure defined in the *all ack context* [described in item a) below in this subclause].

  — Otherwise, the recipient shall follow the procedure defined in the *block ack context* [described in item d) below in this subclause].

Source: IEEE 802.11 ax, Page 330 of 766

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a) *All ack context:* If the originator had set the All Ack Support subfield in the HE Capabilities element to 1, then the recipient may set the Ack Type field to 1 and the TID subfield to 14 to indicate the reception of all the MPDUs carried in the eliciting A-MPDU or multi-TID A-MPDU. Otherwise, the recipient shall not set the Ack Type field to 1 and the TID subfield to 14. The Multi-STA BlockAck frame shall contain only one Per AID TID Info field addressed to an originator in the Multi-STA BlockAck frame. The recipient determines that all the MPDUs carried in the eliciting A-MPDU were received if there were no MPDU delimiter CRC errors and no MPDU FCS errors in that A-MPDU.

Source: IEEE 802.11 ax, Page 331 of 766

d) *Block ack context:* The recipient shall set the Ack Type field to 0 and the TID field of a Per AID TID Info field to the TID value of MPDUs requesting block acknowledgment that are carried in the eliciting A-MPDU or multi-TID A-MPDU.

The Multi-STA BlockAck frame may contain multiple occurrences of these Per AID TID Info fields addressed to an originator, one for each MPDU that is requesting block acknowledgment. In such cases, the Block Ack Starting Sequence Control and Block Ack Bitmap fields shall be set according to 10.25.6 for each block ack session and according to 26.3 for each block ack session with dynamic fragmentation.

The allowed values for the TID field in this context are 0 to 7 (for indicating block acknowledgment of QoS Data frames).

Variable bitmap lengths may be included in the Per AID TID Info field when the originator and recipient negotiate their use as defined in 26.4.3.

Source: IEEE 802.11 ax, Page 331 of 766

The AP shall follow the EDCA procedure defined in 10.23 and the following additional rules:

— If at least one of the frame exchanges in HE DL MU operation requires an immediate response (i.e., the AP includes at least one triggering frame) and if the AP receives an immediate response with at least one correct MPDU from at least one of the solicited STAs, the frame exchange is successful.

— If at least one of the frame exchanges in HE DL MU operation requires an immediate response (i.e., the AP includes at least one triggering frame) and if the AP receives no immediate response, the frame exchange is not successful.

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10.23.2.2 EDCA backoff procedure

Change the second paragraph in 10.23.2.2 as follows:

For the purposes of this subclause, transmission failure of an MPDU is defined as follows:

— After transmitting an MPDU (even if it is carried in an A-MPDU, ~~or~~ as part of a VHT or S1G MU PPDU, or as part of an HE MU PPDU that is sent using TXVECTOR parameter NUM_USERS > 1) that requires an immediate response:

  — The STA shall wait for a timeout interval of duration aSIFSTime + aSlotTime + aRxPHYStartDelay, starting when the MAC receives a PHY-TXEND.confirm primitive. If a PHY-RXSTART.indication primitive does not occur during the timeout interval, the transmission of the MPDU has failed.

  — If a PHY-RXSTART.indication primitive does occur during the timeout interval, the STA shall wait for the corresponding PHY-RXEND.indication primitive to recognize a valid response MPDU (see Annex G) that either does not have a TA field or is sent by the recipient of the MPDU requiring a response. If anything else, including any other valid frame, is recognized, the transmission of the MPDU has failed.

— The nonfinal (re)transmission of an MPDU that is delivered using the GCR unsolicited retry retransmission policy (10.23.2.12.2) is defined to be a failure.

— In all other cases, the transmission of the MPDU has not failed.

Source: IEEE 802.11 ax, Page 259 of 766.